

## THERAPEUTIC AND NUTRITIONAL MANAGEMENT OF CARDIAC DISEASES IN DOGS

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Canine population in Kerala has increased considerably during the recent period and owners are highly concerned about the welfare of their pets. Due to expert care and disease prevention strategies, the longevity of pets has increased to a great extent. So much so, most of the aged dogs are affected with cardiac diseases especially congestive heart failure and dilated cardiomyopathy (DCM). So the present day Veterinarians should be fully equipped with the knowledge of therapeutic and nutritional management of cardiac diseases in dogs.

Congestive heart failure (CHF) is the clinical manifestation of most of the chronic congenital and acquired heart diseases. Left side heart pathology (left-sided congestive heart failure) is clinically characterized by exercise intolerance (difficulty in climbing stairs, easily tired during walking, running etc.), orthopnoea (difficulty in breathing when lies down), night or early morning coughing (nocturnal or cardiac cough), paroxysmal coughing (cardiac asthma), sudden fainting especially after a violent running (cardiac syncope), lung oedema (left side (L) for lung) with frothy blood tinged discharge from the nostrils, dyspnea, cyanosis and death. Most common cause of left sided congestive heart failure is mitral valvular diseases. Most of the aged dogs with mitral insufficiency will show mitral regurgitation sounds (squishing sound) during auscultation of heart.

Right-sided congestive heart failure is characterized by congestion or pooling of blood in systemic circulation (Right side (R) - Next letter S, for systemic circulation). This results in congestion and enlargement of systemic organs like liver, spleen and kidneys. Most common presenting sign will be oedema of all the four limbs. Fluid accumulation in body cavities causes ascites, hydrothorax and hydropericardium. Lack of blood supply to brain may result in epileptic convulsions and defective tissue oxygenation cause cachexia (cardiac cachexia). One of the important causes for right-sided heart

failure is chronic lung disease, like consolidation of lungs. This type of heart disease is called as cor pulmonale.

Eventually right-sided failure can lead to left sided failure or left sided failure can lead to right sided failure (Generalized cardiac failure).

Among cardiomyopathies, dilated cardiomyopathy (DCM) is very common among breeds like Boxers, Cocker spaniels, Dobermans, Great Danes etc. Dogs of any age can be affected with this condition. Deficiency of nutritional factors like L-carnitine and Taurine are attributed as causative factors. There will be serious myocardial dysfunction leading to signs of congestive heart failure and death. In Doberman pinschers there is a relatively long period of 2 to 4 years without clinical signs of illness (the "occult" phase), during which changes occur in the heart muscle and rhythm disturbances progressively worsen. Sudden death occurs in about 25% of these dogs. Others will go on to develop congestive heart failure. Weight loss is often sudden and dramatic in these dogs. Death usually occurs fairly soon after clinical signs develop, often within 6 months.

### Diagnosis

1) History, symptoms, clinical examination including heart auscultation

2) Electrocardiography (ECG) - Note the rate (Most uncompensated heart failures, heart rate will be highly elevated), patterns of chamber enlargement and arrhythmia. Giant breeds with dilated cardiomyopathy typically show signs associated with abnormalities of heart rhythm (particularly atrial fibrillation).

3) Echocardiography - Observe for reduced contractility, ventricular dilation (may not be seen in boxers). Valvular function can be evaluated.

4) Radiology: Cardiac enlargement and oedema of lungs are commonly observed.

### Step-wise procedure in treating Heart failure

If one step is not producing the desired effect the next step can be adopted. Chronic heart failure can be successfully managed only by rationally combining various treatment modalities.

*Various steps are*

1) Salt and exercise restriction

2) Diuretics- Frusemide @ 2-4 mg / Kg BID or TID orally in chronic cases and intravenously (2-8 mg / kg every 1-2 hours) to treat heart failure with acute lung oedema. Potassium should be supplemented orally (Pot chlor Syrup)

When treatment with frusemide is continued more than 5 days, potassium sparing diuretic like spironolactone (@ 1-2 mg / kg orally BID) or a combination of frusemide and spironolactone (eg. Lasilactone) may also be given.

3) Positive inotropes : For CHF Digoxin (Lanoxin tablets-0.25 mg) given orally @ 0.22 mg / M<sup>2</sup> based on the body surface area. Approximate dose for small breeds is 0.02 mg / kg, for medium dogs-0.01 mg / kg and for larger breeds-0.005 – 0.007 mg / kg. The calculated dose must be reduced by about 30 to 50 percent for Doberman breed and in renal diseases, hypokalaemia, cachexia, obesity, aged animals and animals with ascites. Digoxin toxicity will be shown as weakness, vomiting, diarrhea, prolonged P-R interval, second degree heart blocks in ECG. If toxic signs develop, dose can be reduced or ACE inhibitors can be tried.

Pimobendan (Vetmedin 2.5, 5 mg capsules) is a new drug which has shown promise in the treatment of DCM. Unlike other positive inotropic agents, it will not increase myocardial oxygen consumption. This can be tried in Doberman with DCM. Dose is 0.2- 0.6 mg / kg orally, one hour prior to feeding.

4) Combination of diuretics and digoxin

5) If there is no response in the above step Vasodilators should be considered.

Commonly used vasodilators are Angiotensin converting enzyme inhibitors(ACE inhibitors). The commonly used ACE inhibitors are 1). Enalapril(Aceten 12.5 and 25 mg tablets) – start with 0.25 mg / kg once daily then can be increased to

0.25 mg / kg BID. 2). Benazepril ( Benace 5 & 20 mg tablets)- 0.25 – 0.5 mg / kg, once daily orally. This can be given in occult cases of DCM. Enelaryl, digoxin and frusemide are used in combination also. Recently, combination of ACE inhibitors and agents belonging to angiotensin II receptor antagonists like Losartan (Sarten 25 mg tablets) are found to effective in non responsive DCM .

6) Controlling Arrhythmias : The arrhythmias whether, atrial or ventricular types should be identified from ECG . Control the signs of congestive heart failure before instituting antiarrhythmic therapy. Common agents used in addition to digoxin to control atrial fibrillation are 1) Diltiazem (Angizem 30&60 mg tablets)- 1 mg / kg orally,TID, 2) Propranolol (Inderal, 10 mg tablets)- 0.05 – 0.1 mg / kg orally TID, initially , titrating up to a maximum of 1 mg / kg TID., 3) Atenolol ( Aten, 25 , 50 mg tablets)- 0.1 mg / kg orally once or twice daily.

To control life threatening ventricular arrhythmias, the drugs used are 1) Lignocaine with out adrenaline ( Xylocard 2 % injection) -2 -4 mg / kg bolus intravenously or 25- 75 µg / kg / minute as intravenous infusion , 2) Mexiletine ( Mexitil , 50, 150 & 200 mg capsules)- 5 -8 mg / kg orally, TID, 3)Sotalol ( Sotagard 40 mg tablets) – 0.5 – 2 mg / kg orally BID.

### Nutritional Management of cardiac diseases

Nutritional support is vital in preventing the progression of chronic heart diseases and dilated cardiomyopathies. Associated nutrients can be remembered by using the ACT with SPEED acronym.

1) A – Arginine will help to improve blood flow and exercise tolerance in dogs with heart diseases.

2) C – Carnitine ( L- carnitine) is critical for fatty acid metabolism and energy production in myocytes. Myocardial L- carnitine deficiency is associated with DCM in Boxers and other breeds of dogs. This can be supplemented with the conventional therapy for cardiac diseases. Supplementation can improve heart muscle function. The recommended oral dose in dog is 50-100 mg / kg every 8 hours. Carnitine supplementation has few side effects.

3) T- Taurine has been linked to cats and some

dogs with cardiomyopathies. Taurine has been reported to have positive inotropic effect. So diet for cardiac pets should contain sufficient Taurine.

4) S - Sodium should be mildly restricted in less severe cases of cardiac diseases. Severe cases especially with CHF need additional sodium restriction. Owners should be advised not to give snacks like chips, commercially available soups, canned food, sausages, cheese etc.

Other important minerals are potassium and magnesium. Potassium and magnesium deficiencies can precipitate arrhythmias. Hypokalaemia can be caused by frusemide therapy or by inadequate dietary intake due to anorexia. Hypokalaemia can precipitate digoxin toxicity. However treatment with ACE inhibitors or spironolactone can cause potassium retention and hyperkalaemia. Potassium content should be increased or decreased to avoid hypo or hyperkalaemia. Some cardiac drugs, like digoxin and loop diuretics are associated with magnesium depletion. Magnesium content of the diet also should be adjusted to avoid hypomagnesaemia. Some dogs may even need oral supplementation.

5) P – Protein should not be overly restricted in dogs with cardiac disease. Over protein restriction will aggravate cardiac cachexia. Nutritional consideration for cachexia should include management of anorexia, if present. The inflammatory cytokines, directly cause anorexia, increase energy requirement and increase catabolism of lean body mass. Supplementation with omega-3 fatty acids (contained in fish oil) can decrease cytokine production thus improve cachexia .

6) E-Energy . Excess energy may lead to weight gain and increased cardiac work load, while too little energy increases the risk of cardiac

cachexia.

7) E- Eicosapentaenoic acid (EPA)

8) D- Docosahexaenoic acid (DHA)- Dogs with CHF will have decreased concentrations of EPA and DHA, compared with normal dogs. Dogs with DCM and CHF should be given fish oil to correct these deficiencies.

In addition to these nutrients, B –vitamins and antioxidants are also important in cardiac diseases of dogs. B-vitamin deficiencies are very common when frusemide is the primary means of therapy for patients with CHF. Dietary supplementation of antioxidants like Vitamin E can reduce the progression of cardiac diseases. Supplementation with Coenzyme Q-10 (an antioxidant) can improve myocardial metabolic efficiency. Formulated prescription cardiac diets containing all these nutritional factors.

#### References

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